AMENDMENTS

In the Specification

[0092] There are many different physical configurations with which a microwave absorbing material can be added to a chromatographic column so as to make it possible to heat the column in a microwave heating apparatus. The microwave absorbing material can be mixed into one of the column components or it can be bonded to the column as an exterior or interior layer. Some combination of these physical configurations could also be used. It should be clear to one of average skill in the art that the invention lies in the addition of the microwave absorbing material to an existing chromatographic column and not in the manner in which it is added.

[0093] Column Assemblies With A Microwave Absorbing Material Adjacent To A Column. A chromatographic column can be heated in a microwave heating apparatus by a microwave absorbing material if the column is located adjacent to the microwave absorbing material such that heat is transferred by the absorbing material to the column via thermal conduction, convection, or radiation. Ideally, the column assembly should keep the temperature difference between the microwave absorbing material and the column to a minimum.

[0120] A microwave signal 90 is coupled into the oven 60 through a coaxial connector 95. The electromagnetic field propagates from left ~~two~~ to right in the space 140 between a metallic cylindrical inner conductor 70 of the coaxial oven 60 and a metallic cylindrical outer wall 80. To prevent undesirable reflection of microwave energy out of the microwave oven 60 through the connector 95, a conical impedance matching section 85 is used to transition between the smaller-diameter coaxial connector 95 and the larger-diameter main section of the coaxial oven 60.

[0138] A problem common to the chromatographic column microwave ovens 60, 61, and 62 and all other oven embodiments described herein is redistribution of heat in the column heating element 130 by air. If gap 140 is filled with air at atmospheric conditions, some of the heat in column heating element 130 will be transferred to the air. Because hot air rises, air movement alters the heat distribution in the oven. Over time, the upper part of the ovens including the upper part of column heating element 130 becomes ~~hoffer~~ hotter than the lower parts. This undermines the isothermal conditions that a carefully designed and symmetrical oven can establish and it will slow heating and cooling times. This problem can be partially addressed by altering the geometry of the oven to compensate for the heat transport in the air. However, this is not a good solution because air driven

heat transport is unpredictable. A better solution to the problem is to pump most of the air out of the interior of the oven such that the undesirable transport of thermal energy from the column heating element 130 does not occur at a significant rate. Subsequent cooling of the column heating element 130 is achieved by reintroducing air into the oven interior and even pumping air through the oven to more quickly remove the thermal energy from the column heating element 130. Heating in vacuum maximizes heating and cooling rates. The performance of all chromatographic column microwave ovens described herein is significantly improved by operating them in vacuum conditions.